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EDITORIAL NOTES

CHEAP GAS

NOT every day do we come across comments so forthright as those expressed by Mr. J. W. Pallister in his Presidential Address this month to the North of England Gas Managers' Association (*ante*, p. 592); and we have no doubt that if discussion had been the order of the day there would have been speakers in plenty and not all of them in one mind with the Author. Nobody could reasonably disagree with Mr. Pallister's motto, which we interpret as "cheap gas combined with good service," and all gas engineers will, we think, while perhaps justifiably envying Mr. Pallister, offer their congratulations that to-day, after several years of war, he is able to offer gas to the ordinary domestic consumer at the price of 5.22d. per therm (500 B.Th.U. gas), no matter how small the quantity consumed—which charge, by the way, falls substantially on a simple block tariff applied to all consumers, industrial and domestic alike. No charge is made for the provision of meters. The charges, he claimed, are the lowest in the country—which incidentally reminds us of the considerable number of letters on this low-price gas matter which we have published in the "JOURNAL" in the past from the executives of undertakings such as Bath, Sheffield, and Widnes (purposely given in alphabetical order), among others.

Middlesbrough enjoys the advantages of a 100% supply of coke oven gas, but, said Mr. Pallister, this has only a small reflection on the financial position (capital of £66 per million cu.ft. of gas sold). And he went on to remark that modern gas-works carbonizing plant can produce gas at very little higher cost than the enhanced value attached to coke oven gas in some of the contracts which have been made; and he added that, while many gas undertakings are purchasing coke oven gas at lower prices than Middlesbrough, they charge much higher prices to their consumers—nor do they provide and maintain adequate stand-by plant at their works. Compare Middlesbrough, where —to quote Mr. Pallister— "we maintain in first-class condition ample plant to meet the whole of our output, which has had to be brought into operation on many occasions at extremely short notice and sometimes for long periods." We tread on thin ice and are wholly open to the hardy frost of correction when we reflect for a moment on Middlesbrough's stand-by plant. According to our records it consists of an inclined retort installation of a capacity of less than a million cu.ft. a day (originally 1¾ million cu.ft.), and three carburetted water gas plants of a capacity of 6 million cu.ft. daily. When stoppages of coke oven gas have occurred, the practice has been to regulate the output of carbonizing and water gas plants so that practically the whole of the coke available from the carbonizing unit was used for water gas making. The inclined retort installation must have been erected some little time ago, and we do not know at what price the coke made in it is debited to the water gas plant. The original two sets of water gas plant were, we believe, installed in 1897. They were remodelled in 1913, in 1927, and in 1934. They are now mechanically operated on the back-run principle. The remaining unit (1½ million cu.ft. capacity) is hand operated.

In his address Mr. Pallister gave no comparison between the cost of gas manufacture in his composite gas-works plant and the price at which he gets the coke oven gas supply, which has, as we have mentioned, only a small reflection on the low charges at which he supplies his consumers with gas. In passing, however, we recollect that at the end of 1938 the Middlesbrough Corporation Gas and Electricity Committee approved a recommendation to the effect that steps be taken immediately for the building at the gas-works of a new carbonizing plant with a capacity of 4,500,000 cu.ft. a day, with provision for extension to a capacity of 6,000,000 cu.ft. In mentioning this we will not sidetrack thought by discussing the difference which undoubtedly exists in the relative coal/coke price ratios between the Coke Oven Industry and the Gas Industry, and which is apt to render somewhat difficult the comparison between the cost of coke oven gas and the cost at which gas undertakings could themselves make coke oven gas for town supply. Nor have we the least desire to minimize the good work at Middlesbrough. We merely record the facts in fairness to others faced with dissimilar conditions, and to point to the effect of local circumstances.

TARIFFS AND LIGHTING

WE gather that it is not to a supply of coke oven gas that Middlesbrough owes its enviable position, but to other causes. Mr. Pallister set out two major factors—the first being municipal as distinct from company ownership, the second lying in the absence of complicated tariffs. We do not propose at this juncture to start an academic argument on the first of these factors. The question of charges for gas comes into a different category, however. Mr. Pallister stated that the policy of his Undertaking has been to maintain the lowest possible price for the domestic consumer rather than to sell large quantities of gas to industrial consumers at "rates which return only the barest margin of profit." But surely the aim of tariffs, which need not be complicated, and if not wholly understood are accepted by and popular with the public, is to enable the domestic consumer, provided he uses gas to a reasonable extent, to have this gas at the lowest possible price. And surely the sales of gas at low rates—rates, however, which show a reasonable margin for the gas undertaking—help, not hinder, the reduction of price to the domestic consumer. We recall the reference in the B.G.F. Planning Report to the situation disclosed by a cost survey of an undertaking whose 150,000 prepayment consumers were unremunerative to the extent of £50,000 by reason of the number whose consumption of gas did not even cover the cost of the maintenance of the supply. The coal trade recovers up to twice the normal retail price for small quantities of coal, and the electricity industry charges for lighting up to ten times the rate for heating. We recall, too, the passage in the Post-war Planning Report of the Institution of Electrical Engineers: "The two-part tariff has so many advantages compared with the flat rate per unit that every effort should be made to secure its universal adoption." We referred to the report in question in the "JOURNAL" of Feb. 9 last, and attention was drawn to the recommendation by a correspondent whose letter we published in last week's issue, a reply to which from Mr. Pallister will be found on p. 657.

Mr. Pallister was certainly forthright in his comments on the domestic lighting load, maintaining that attempts made to retain domestic gas lighting and to advertise it do harm to the Industry—they only give the impression that gas is old-fashioned. Electric lighting in gas showrooms and offices, he said, should be universal. Our efforts should, in brief, be concentrated on the development of those loads for which gas is pre-eminently suited on every count—which loads do not include lighting. Mr. Pallister has a domestic lighting load, and he does not allow it to suffer from neglect, but we gather that he would be heartily glad if he had not to cater for it. His over-riding contention was that, if we see more daylight and less gaslight, and make a sort of super-service of the gas cooking, space heating, and water-heating loads, then we ought to have no fear at all about the complementary use of electricity in the home. Indeed, we should harness electricity to gas service. Electric ignition for cookers, for instance, gas-heated laundry equipment coupled with electrically operated wringer—and so on. We use electricity in our works for the making of gas. Why not—where it proves feasible and practical—make it help to popularize gas appliances?

That would seem to be the query put by Mr. Pallister. We could, for example, have an electric-motor operated door to the gas cooker or an electrically lighted oven. Perhaps the answer will lie in determining the point at which the question "Is it really necessary?" applies.

Personal

Changes at Sheffield

Mr. HORACE CHAMBERLAIN, 25 years Engineer to the Sheffield and District Gas Company, has resigned his position owing to ill-health. For some time Mr. Chamberlain has been unwell and recently was away ill for seven weeks. He reached retiring age last November, but remained in office at the request of the management. At a Board meeting last week the Directors decided to accept his resignation and placed him on the retired list, at the same time recording their appreciation of his long period of able and devoted service.

As a result, a number of changes have been made among the executive officers as follows:

Mr. RALPH HALKETT, junior, is now appointed Chief Engineer and Assistant General Manager, relinquishing the office of Secretary in favour of Mr. A. W. FIELD.

Mr. F. G. PYPER becomes 1st Assistant Chief Engineer.

Mr. JOHN BATEMAN, at present Superintendent at the Neepsend Station, becomes 2nd Assistant Chief Engineer.

Mr. A. E. DICKSON, now Superintendent at the Effingham Street Station, becomes Superintendent at the Neepsend Station.

Mr. J. W. STACEY, now Assistant Superintendent at the Neepsend Station, becomes Superintendent at the Effingham Street Station.

Mr. H. W. KENWORTHY, at present Assistant to the Superintendent at Grimesthorpe Station, becomes Assistant Superintendent at Neepsend Station.

Mr. W. E. BRAITHWAITE fills the new appointment of Personal Assistant to the Assistant General Manager.

* * *

Mr. E. H. HARMAN, Secretary of the Commercial Gas Company, has been appointed General Manager of the Company. He retains the office of Secretary.

* * *

Following the death of Alderman Sir James Macklin, J.P., D.L., Chairman of the Salisbury Gas Company, Mr. W. FIELDEN, Managing Director and Engineer to the Company, who has been acting Chairman for the past 12 months, has been elected Chairman and Managing Director. Mr. Fielden, who is also a Director of the Wilts and Dorset Motor Services, Ltd., has been with the Company since July, 1915, was formerly for 13 years Engineer and Manager to the Staines and Egham Gas Company, leaving the latter on its amalgamation with the Brentford Gas Company in December, 1914.

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Mr. H. H. KNOWLES, at present Assistant Gas Engineer and Manager, has been appointed to succeed Mr. F. G. Shaw as Gas Engineer and Manager at Buxton. Mr. J. PARKER has been promoted from Technical Assistant to the post of Assistant Gas Engineer and Manager. Both appointments to date July 1.

Mr. F. G. SHAW, who retires on June 30, proposes to carry on certain of his Gas Industry activities, and is adding to his Consulting work at 2, Grosvenor Mansions, Broad Walk, Buxton; telephone No. 328.

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Mr. M. BURNINGHAM, Director and Secretary, has been elected Deputy-Chairman of Messrs. Keith Blackman, Ltd. Mr. Burningham joined the firm in 1896, became Secretary in 1925, and was elected to the Board in 1929.

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Mr. F. E. COX, Engineer and Manager of the Tiverton Gas Department, informs us that his son, Sergeant CECIL HAROLD COX, who died on April 22 of injuries sustained as the result of an aircraft accident, was appointed to a Commission in the Royal Air Force in the rank of Pilot Officer on probation with effect from Dec. 10, 1943.

Obituary

A. E. Broadberry.

The death has occurred of Mr. A. E. Broadberry, M.Inst.C.E., who retired from the Board of Directors of the Tottenham and District Gas Company last December. Deceased was apprenticed to the Company in 1879, and continued with the Company as Engineering Assistant and Assistant Engineer till 1899, when, on the death of his father (Mr. W. H. H. Broadberry), he was appointed to the chief position after 20 years' service. He retired from the position of Chief Engineer and General Manager in 1922, when he was appointed to the Board. A Past-President of the Southern Association of Gas Engineers and Managers and of the Eastern Counties Gas Engineers' and Managers' Association, Mr. Broadberry was President of The Institution of Gas Engineers in 1916–17. He was elected a Vice-President of the B.C.G.A. in 1923.

Mr. John Terrace writes:

The recent death of Arthur Edward Broadberry at the ripe age of 80 brings to a close a long and useful career in the Gas Industry. His whole period of service was with the Tottenham Company, where, after serving a pupilage with his father, who was Engineer and Manager of the Company, he became successively Assistant Engineer, Chief Engineer, General Manager, Director, and Deputy Chairman. On his retirement from the Board last December, the Chairman, Mr. Henry Woodall, after suitable eulogistic remarks, observed that during Mr. Broadberry's 65 years' service with the Company, the output of gas had increased by 65 times—a wonderful record. This remark calls to mind the experience of the writer that in his seven years' association with Mr. Broadberry and the Company—1902 to 1908—the annual output of gas increased from 660 million to 1,400 million cu.ft.—*i.e.*, more than double. The problem of dealing with this abnormal increase was complicated by the fact that a scheme of complete reconstruction of the works had to be carried out at the same time.

Mr. Broadberry was a fine Constructional and Civil Engineer, with a natural liking for detail, and was equally at home in designing a gas retort setting or a gasholder, with both of which he had considerable experience. The continual need for extending the works gave him the opportunities of exercising his skill, and the carbonizing plant under his care advanced successively from direct-fired hand-charged horizontal retorts *via* regenerative settings, first with the hydraulic stoking machinery and then with electrically driven machinery, to vertical retorts, which included mechanically operated producers for heating them. Quite early he appreciated the advantage of properly graded coke and installed Zimmer screens for the purpose.

His long row of gasholders steadily increasing, each one holding approximately the same quantity of gas as all its predecessors, and his pride and enthusiasm in this and the somewhat original form of latticed standard designed so that all the girders were of the same length but with decreasing width, and all with square corners, was an inspiration to "get one's pleasure out of one's work."

During this same period the Southern Association embarked on their investigation into the naphthalene question, and Dr. Colman, who had just left Birmingham to become a Consulting Chemist in London, carried out the experiments at the Tottenham Works, and these included the installation of, the writer believes, the first cyclone tar extractor to be erected in a gas-works. Mr. Broadberry, with his usual enthusiasm, entered whole-heartedly into the chemical problems presented and the installation of the trial plant to effect a cure of what at that time was a very great bugbear.

Carburetted water gas plant had been introduced in the early 'nineties and formed about 40–50% of the gas sent out. The manufacture of C.W.G. was conducted as a separate unit, giving opportunities for comparing the difference in necessary area of purifiers required, all particulars being carefully noted and investigated. In this same connexion tar cyclones were adopted at the outlet of the relief holder for removing the oily vapour from the gas, and considerable trials made of different mechanical stokers for burning breeze in the boilers.

Of sulphur compounds and their removal by lime purification to comply with the then statutory requirements of 20 grains per 100 cu.ft. little need be said, beyond that at times there were anxious moments.

Distribution problems which arose through the heavy and continued increase in the quantity of gas to be dealt with brought their own troubles, and were successfully dealt with by the laying of trunk mains and the installation of boosters, which at that time was somewhat novel.

In spite of all these activities with the Gas Company he found time to give help in the affairs of the Southern Association and the Eastern Counties Gas Managers' Association, in both cases becoming President. He was also a strong supporter of The Institution of Gas Engineers, and was President in 1916–17. Later, from 1926 to 1932, he acted as Honorary Auditor.

His chief relaxations were motoring, of which he was an early enthusiast, and Masonic activities. He was a Past-Master of the "Evening Star" Lodge, and was a regular attender until it became physically impossible.

Of the man himself, he was upright in all his actions, a good disciplinarian, with a memory like a log-book (as one of his assistants whimsically described this attribute), which was the terror of delinquents, and withal he was kind and considerate and helped many a lame dog over his style. He did much for the comfort of his employees in their off-duty time, and one remembers that even in those days, when he was associated with them, that now seem so long ago, there were a social club, a bowling green, football ground, &c., and a miniature rifle range.

All those who served under him remember him with gratitude for the kindly interest he took in their welfare, and mourn the loss of an old friend.

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The death occurred on April 27 of Mr. F. C. ELTON, who had been in the service of William Sugg & Co., Ltd., for 35 years, and had for some years past occupied the position of Sales Superintendent.

Letter to the Editor

The Question of Tariffs

DEAR SIR,—Referring to a passage in my recent Address to the effect that consumers do not like and cannot understand complicated tariffs, your correspondent "Price Appeal" states, "The fact is, of course, that domestic consumers like and fully understand the two-part tariff when properly presented to them."

The answer lies in the passage which "Price Appeal" himself quotes from the Post-War Planning Report of the Institution of Electrical Engineers, wherein he states that "recognizing that to secure the full effect the two-part tariff should be universally adopted, they suggest that the Commissioners might be given powers to approve any undertaking offering a two-part tariff only with no alternative flat rate." This is a clear indication that consumers are *not* attracted by the tariff, and the only means of securing its wide application is to *force* them to adopt it by removing their choice of the alternative flat rate.

Of course, I quite appreciate the advantages to be gained from simple and easily understood two-part tariffs if powers could be obtained to apply them universally and compulsorily to all consumers without alternative, and I would welcome such powers. But in the absence of such power I prefer to sell at the lowest possible basic price on a block tariff, applicable to all consumers, rather than adopt an *optional* two-part tariff.

Corporation Gas-Works,
Middlesbrough.
May 20, 1944.

Yours faithfully,
JOHN W. PALLISTER,
Engineer and Manager.

Institution of Gas Engineers

The Council of The Institution of Gas Engineers met in London on May 9, and the following were some of the matters dealt with:

The deaths of six members of the Institution were reported, including Mr. F. Prentice (Ipswich) and Mr. F. Osmond (Dorchester), former members of the Council.

Nominations were made for the election by ballot in June of a Vice-President and Ordinary Members of Council.

In view of the present war situation, the Council decided with regret, after careful consideration, to cancel the provisional arrangements for holding the 81st Annual General Meeting in Edinburgh on June 13 and 14. It was agreed that the Presidential Address, Reports, and Papers, which would have been presented at the meeting, should be published and made available as usual, and that written contributions to the discussion of the appropriate Reports and Papers should be invited.

The 81st Annual Report of the Council for the year 1943–44 and Accounts for the year 1943 were approved for submission to members of the Institution.

A report was made of the meeting of the Committee of Management of the Benevolent Fund held on April 17, and the Annual Report of the Committee for 1943–44, which will shortly be published and circulated, was received and considered.

A report was made of recent meetings of the following Technical Committees: Gas Installations Committee; Liquor Effluents and Ammonia Committee; Codes of Practice Sub-Committee. A fifth Code of Practice, completed by the Sub-Committee, was approved for submission to the Ministry of Works.

A report was made of the first meeting of the newly appointed Careers Sub-Committee.

A report was made of the sixth meeting of the Co-Ordinating Committee of the Gas Engineering Advisory Boards, held on March 15, attended by the Director of the Gas and Electricity Division of the Ministry of Fuel and Power and members of his staff. It was reported that, on the resignation of Dr. E. V. Evans, O.B.E., from the Chairmanship of the Committee, Mr. S. E. Whitehead, J.P., B.Sc. (Southampton), and Mr. C. F. W. Rendle (Redditch) had been unanimously elected Chairman and Vice-Chairman respectively of the Committee.

It was resolved that the Institution Bronze Medal, 1943, be awarded to Mr. J. A. Tomes (Stourbridge) for a Paper, "Some Effects of War on the Economics of Gas Manufacture and Supply," read at a meeting of the Midland Junior Gas Association on Aug. 26.

It was further decided not to award the Institution Silver Medal, 1943.

Matters raised by District Members of Council were discussed, including the present position in regard to the setting-up of scales of salaries for the various grades of technical personnel in the Gas Industry.

The progress of the work of the Gas Research Board was reported, and nominations were made of a Vice-President and three members of Council of the Board, to take office in June.

The **Institution of Gas Engineers** has asked us to point out a small error in the report of the Gas Installations Committee to the Ministry of Works, to which we referred in last week's "JOURNAL." On p. 12 of the report, para. 47, iii, for "brass" pipe read "copper" pipe. The reference 1 on the same line should be transferred to the words "brass pipe" in the following line (sub-section iv), to which it in fact relates.

The South Wales Coalfield

A new and important contribution to our knowledge of South Wales coals has just been issued by the Fuel Research Organization of the Department of Scientific and Industrial Research in the form of an Isovol Map of the South Wales Coalfield.* On it are plotted, by means of lines of equal volatile content ("isovols"), the results of the volatile matter determinations on the samples of coals so far obtained. Improvements in, and the standardizing of, the methods of analysis have in recent years made it possible to determine the volatile matter in a manner that can be relied upon to give consistent and comparable results. Since volatile matter constitutes, especially in South Wales, a valuable index of the physical and chemical nature of the coal, the map forms a summary of much of the work of the Fuel Research Coal Survey in this area up to date, and shows, in a very simple form, accurately where each of the widely differing coals occur in this district.

Concurrently with the publication of the map, a booklet† is also issued which describes how the map was compiled, its implications, and how it should be used.

To those interested in the Coalfields of South Wales, these two publications should prove of great value.

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* *An Isovol Map of the South Wales Coalfield.* Published by H.M. Stationery Office, price 1s. 3d. net.

† Fuel Research Survey Paper No. 56, *A Description of an Isoval Map of the South Wales Coalfield.* Published by H.M. Stationery Office, price 6d. net.

Diary

May 25.—Midland Junior Gas Association: Visit to the works of John Wright & Co., Ltd. (Radiation Ltd.), Aston, Birmingham, 4 p.m.

May 25.—Lancashire and District Coke Association: Annual General Meeting, Engineers' Club Rooms, Manchester, 11.30 a.m.

May 26.—B.C.G.A. Domestic Heat Services Committee: Gas Industry House, 2 p.m.

May 28.—Scottish Junior Gas Association (Eastern District): Annual Meeting, Heriot-Watt College, Edinburgh.

May 31.—Eastern Counties Gas Engineers' and Managers' Association: Spring Meeting, Connaught Rooms, Kingsway, W.C. 2.

June 2.—Gas Research Board: Joint Committee on Methane Synthesis, Gas Industry House, 2 p.m.

June 5.—Association of Gas Corporations: General Purposes Committee, 2.30 p.m.; Council, 3.30 p.m., Gas Industry House.

June 5.—B.C.G.A. Executive Committee: Gas Industry House, 2 p.m.

June 6.—Gas Research Board: Finance Committee, 11.15 a.m.; Membership Committee, 12 noon; Council, 2.30 p.m., Gas Industry House.

June 15.—Gas Research Board: Refractory Materials Joint Committee, Stoke-on-Treat, 2.30 p.m.

There will be no meeting of the N.G.C. Central Executive Board in June.

South-Western Gas and Water Corporation

The Tenth Ordinary General Meeting of South-Western Gas and Water Corporation, Ltd., was held on Thursday last at Shell House, 55, Bishopsgate, London, E.C.

Mr. Bruce Ottley, the Chairman, who presided, said: Once again I am precluded from giving you anything in the nature of a detailed report on your Corporation's progress, but you will, I think, be interested in the following:

We have been able to realize at a satisfactory figure a large proportion of our investments in companies other than subsidiaries. They figure in the balance-sheet at £86,000, as against nearly £200,000 last year. Depreciation in these investments, therefore, which has been a constant anxiety to us in the past, and to which I have frequently referred in my annual speeches, has assumed a more manageable figure.

Last year's balance-sheet showed a bank overdraft of £36,000. This year we have a credit balance of £18,000 at our disposal, and in addition an investment of £50,000 in 2½% National War Bonds. Income from investments should show an improvement in the current year. Central administration expenses show a tendency to decrease. We can, on the whole, therefore, look forward to improved results for our 1944 working.

It only remains to me to congratulate Mr. Allen and his people for the good work they have put in during the past year, which again has been one of considerable difficulties.

The report was adopted.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in the "Journal" should not be taken as an indication that they are necessarily available for export.

Production of Free-Burning Coke in Gas-Works at Normal Carbonizing Temperatures*

By G. M. GILL, M.Inst.C.E., M.I.Mech.E.,

Managing Director and Chief Engineer, Severn Valley Gas Corporation, Ltd.

I. SUMMARY

In the Introduction it is explained that one of the main objects of the work described herein was to use the non-coking coals produced in the locality of the three Gas-Works which played a part in these practical experiments. The Paper sets out the general characteristics of the coking or gas coal used for blending. It is, in fact, a gas coal of high gas-making qualities with coking properties rather above the average. Experiments were made with many types of non-coking slacks, of which a good number were suitable, but finally the choice was limited mainly to two varieties, which were deemed to be the most suitable in price and quality. The characteristics of a suitable non-coking slack are explained in the Paper.

The method of blending by hand at the Lichfield Works is described, while the mechanical blending plants at the other two Works were of normal types.

A summary of results at Lichfield is given in a table from which is shown the effect on costs of gas-making, while it is also noteworthy that the gas consumer benefited materially from this development.

The fact that non-coking slack as largely used in this work contains 15% less gas and makes 22% less coke than a good gas coal, indicates that such coals should be considerably cheaper than gas coals to make the change profitable.

The types and characteristics of the resultant coke made are described at considerable length; and in these, comparisons are made of the special coke, when burnt in the same grate, with (*a*) low-temperature fuel, (*b*) a free-burning coal, and (*c*) ordinary gas coke.

The results are shown in graphs plotted from the records observed on a radiometer.

II. INTRODUCTION

The Author has for many years been convinced, as the result of a good deal of study and of investigations both at home and abroad, that many coals can be up-graded by the simple process of blending. Thus coal A may have a deficiency in one respect, while coal B may be particularly strong in that direction, so by blending the two together each coal is improved, and the blend itself becomes of better quality than either of the two individual coals considered separately.

Some coals have deficiencies which render them unsuitable for certain purposes, such as non-coking coals for gas-making, but other coals have coking properties which are so strong that the coke is too hard and close-grained to be ignited or burnt readily. By blending the two, both faults are counteracted, with the result that both coals become more suitable for the purpose in view.

The scope for blending in this country is considerable, and it is a subject which no skilled gas engineer can afford to ignore.

It is a fact worthy of note that scores of Gas-Works in America and Germany are equipped for the mechanical blending of not only two, but often three coals, to up-grade such coals and render these as suitable as possible for carbonization and the making of coke of the required properties.

Soon after Gas Consolidation Limited acquired control of the Lichfield, Tamworth and Cannock Gas Companies in the years 1934–35, it was decided to try out on a working scale some proposals which had emanated originally from John Roberts, the consulting fuel technologist, whereby reactive coke could be made at high temperature from the carbonization of blends of coking and non-coking coals.

These Companies are closely adjacent to collieries where non-coking coals are mined, and such coals were readily available at a reasonable price. Following on this decision, the gas coals already in use were tested for their coking properties by the normal methods used for this purpose.

* I.G.E. Publication No. 264.

III. SUITABLE GAS COALS FOR BLENDING

Coking tests were made of each coal, and from the size and shape of the buttons made in crucible the coking number of each coal was ascertained, as shown in fig. 1. Large charges were then carbonized in salamander and/or fireclay crucibles. Some of the coals in use were found to have insufficient coking properties to render it practicable to blend these with non-coking coals; it was also found inadvisable to use coals with a lower coking index than No. 9, nor of a size larger than about ¾ in.

The coking coal normally used for blending, as eventually determined after experiments, was a high-class gas coal of bean size—½ in. to 1 in. Its average analysis and characteristics, which varied within reasonable limits, were as follows:

Number of tests during 1938 (typical of hundreds of tests made over the whole period)	36
Moisture, per cent.	1.8
Volatile content, per cent.	33.91
Ash content, per cent.	2.57
Therms of gas per ton	78.1
Coke, cwt. per ton	12.92
Coking number	10.5

It was proved, however, that there are undoubtedly many gas coals quite suitable for blending with an equal quantity of non-coking slacks to produce well-formed coke, and strong enough for screening and handling and for delivery to customers.

Non-Coking Slacks Used for Blending.

The non-coking coals used consisted of various washed slacks, most of which would pass through ½ in. square mesh sieve. These coals, of which 20 varieties were used to the amount of 23,404 tons in all at various times at the Lichfield, Tamworth and Cannock Works, were mined for the most part within 10 miles of these Works, and were delivered by lorry from colliery to Lichfield and Tamworth and by rail to the Cannock Works, which has its own siding.

At the Lichfield Works, to which this Paper mainly refers, 9,218 tons of non-coking slacks were carbonized during the years 1934 to 1940 inclusive, which quantity was equivalent to 23.7% of all the coal used during that period. The non-coking slack which was finally chosen as very suitable, and of which many thousands of tons were used, had the following analysis and characteristics:

Number of tests during 1938 (typical of a large number of tests made over the whole period)	8
Moisture content, per cent.	16.76
Volatile content, per cent.	33.65
Ash content, per cent.	5.08
Therms of gas per ton	66.46
Coke, cwt. per ton	10.2
Coking number	1

As will be observed, the above non-coking slack has the usual characteristics which are typical of this class of coal. It is very high in moisture, because it is washed and, being small, is absorbent. This is a drawback in these coals. Further, the volatile content suggests a normal make of gas per ton of coal, but actually it is, say, 15% lower than would be anticipated from the analysis, due to the fact that the water of constitution is much higher with non-coking coals than with a typical gas coal. In other words, a good deal of the volatile content produces liquor instead of gas. It might here be explained that the gas-making tests as set out above were carried out in a British Furnaces test plant with 2.24 lb. charges and with a retort wall temperature of 1,000°C. and level gauge in the retort. With this type of test plant under these conditions a good quality gas coal will produce 76 to 82 therms per ton, while the non-coking slacks vary for the most part from 59 to 69.

Fig. 1.—*Range of Coke Buttons.*

Resultant Blend.

The average of the two coals of which the analyses are given above would, when blended, give an analysis approximately as follows:

Moisture content, per cent.	9.28
Volatile content, per cent.	33.78
Ash content, per cent.	3.82
Therms of gas per ton	72.28
Coke, cwt. per ton	11.56
Coking number	7 to 8

It does not follow, however, that the analysis of the blend and the test of its gas-making qualities will enable one to produce the theoretical result expected, and therefore theoretical expectations must be checked in the laboratory and miniature gas-making plant, and finally on the Works, before any definite opinion of the suitability of the blend can be formed. Actually this particular blend, of which many thousands of tons were carbonized, was a success in practice.

IV. METHOD OF BLENDING

It was found that a gas coal with good coking properties would absorb an equal quantity of non-coking slacks. The first and only method adopted at Lichfield was to blend by mixing a shovelful of one coal with a shovelful of the other. The two coals were mixed in this way by two men throwing the respective coals into the boot of an elevator. This delivered the coal to an overhead hopper which supplied the hopper of the charging machine, from which the retorts were charged by a Guest-Gibbons charger-discharger. Although the blending was carried out in this primitive way, the result was highly satisfactory and was continued for several years, without it being at any time observed that there was any serious increase in the quantity of breeze made. Only one adjustment was found to be necessary. When shovelling ton for ton of coking and non-coking coal it was noted that a quantity of the lighter non-coking coal remained on the floor after clearing the ton of coking coal of higher specific gravity. To overcome this the man handling the coking coal chipped an inch off the edge of his shovel.

At this particular Works the steam required is generated in one of two Cornish boilers which have always been fired by breeze. At no time has it been necessary to sell any breeze at this Works, but generally the breeze has had to be supplemented by a certain amount of coke for use on the boiler, and occasionally breeze has been supplied for this purpose from other Works. The success of this simple method of blending proportions of 50% of gas coal and 50% of non-coking coal merely by co-ordinated work with shovels has never ceased to surprise the Author, who expected a decided increase in the proportion of breeze made; but this did not materialize, while the coke itself has been throughout quite strong enough to be handled without undue breakage.

Segregation in Hoppers.

When blending non-coking slacks of, say, ¼ in. to ⅛ in. with coking beans of 1 in. to ½ in., as has been the practice in the Works in question, there is a danger of segregation in the hoppers, whereby the fine portions of the coal drop in the centre of the hopper and the larger portions run down the slope of the heap to the side of the hopper.

This trouble was at no time experienced except to quite a minor extent at Lichfield, probably due to the fact that the retort-house hopper was small and narrow, as was the machine hopper. At Cannock, where the overhead hopper is large and wide—and there is also only one hopper—this trouble was often experienced in the early days, but not later after a blending plant and a breaker had been installed to crush all the coal to ½ in. and less.

Type of Retort Plant in Use.

The retort plant at Lichfield consists of six horizontal settings, each with six retorts, 20 ft. long by 24 in. by 16 in. The heats employed have not been high, namely, 1,100°C. to 1,301°C.—with an average of 1,230°C. for 211 tests in 1936–1937—in the combustion chamber, as the retorts were mainly of fireclay construction. The coke was pushed out in the earlier period into coke barrows which were wheeled into the yard and quenched by bucket. A portion of this coke was then loaded into an elevator of the coke-cutting and screening plant. During the later period a Le Fleuve plant was installed, from which the coke was transported by means of a belt conveyor to a cutting and screening plant. Although the installation of the coke-handling plant has increased the handling of the coke, it has at no time created any problem due to excessive breakage of coke and surplus production of breeze.

V. SUMMARY OF WORKS RESULTS

As an indication of the scale of operations at this particular Works and of the results achieved when using varying quantities of non-coking coal the figures in Table I are given.

Variety and Number of Coking and Non-Coking Coals Used.

As will be seen, the experiment of using non-coking coal commenced in 1934, when instead of using, as in the past, 5 ordinary gas coals, experiments were made with a further 11 coals, of which 4 were new gas or coking coals of small size and 2 were non-coking slacks.

In 1935 no fewer than 19 gas and coking coals and 9 non-coking slacks were tried out in the Works.

In 1936, 6 gas and coking coals and 4 non-coking slacks were used, while in 1937 the number was reduced to 3 gas and coking coals and 2 non-coking slacks. The smaller number used was due to the fact that practical experiments had shown the coals which were most suitable.

As will be seen from Table I, it can be claimed that the gas-making results were generally satisfactory during the years when the work was proceeding, having regard to the lower yield of gas and coke from non-coking coal.

The Author would point out that he had nothing to do with the results for the year 1933, as the Company became a member of the Gas Consolidation Group during 1934. As will be observed, there was not much improvement of any kind in 1934, but in 1935 there were a number of improvements in the financial and technical results. The coal bill showed a marked reduction, as did net coal cost and cost of gas into holder, while therms made per ton increased to a reasonable figure, having regard to the use of 24% of non-coking coal. Certain coals bought under a long-term contract were still being used. This fact prevented a quick change-over to the use of a large proportion of non-coking slacks.

Benefit to Consumer.

However, good progress was made, and from the savings in costs a satisfactory reduction was made in the price of gas and, in fact, there was no increase in the average price of gas per therm sold between 1935 and 1942, although in the meantime the price of coal delivered to the Works had increased from 20s. 8d. for 1935 to 38s. 7d. for 1942, or 87%. It will be observed that coke made for sale per ton of coal was low, and varied from 7.2 to 8.27 cwt. per ton of coal carbonized during the years 1935 to 1939 inclusive, when a good proportion of non-coking slacks were being used. A low result in this respect is more or less inevitable, as the coke made from a ton of non-coking coal is about 3 cwt. less than from a ton of average gas or coking coal. A contribution to the low figure in this respect may have been a larger amount of breeze, but no check was placed on this, as all breeze was wheeled unweighed to the boilers. It will be noted that the price of coke showed a substantial increase for the year 1936. This was due to the fact that a coke-screening plant was installed and mainly as a result higher prices were obtained, while in addition an exceptionally low price to a large contractor was discontinued.

Abandonment of the Process.

During the years 1934 to 1940 inclusive no less than 9,218 tons of non-coking slacks were carbonized at this Works, with a make of gas increasing from 59 million cu.ft. in 1934 to 82 million in 1940, and consequently, due to the high proportion of such coal used, a good deal of practical experience was obtained. It was quite successful, technically and also financially, but various factors conspired to compel a change to the use of normal gas coals.

In the first place, there was necessarily a good deal of delay in deciding upon the best coals to use. So many experiments had to be made, and during a time when a considerable quantity of unsuitable coal for blending had to be used as certain coal contracts had not expired. No sooner had the correct coals to use been discovered than there was the effect of the Coal Mines Act, 1930, coming into operation, as the result of which it was found that freedom to select coals was curtailed, while later the selection was transferred to the Coal Sales Committees set up by the colliery owners, and from that time and due to this cause there was no more freedom in the selection of coal.

(*To be continued*)

Table I.—*Summary of Results at Lichfield.*

1.	1933. 2	1934.* 3	1935. 4	1936. 5	1937. 6	1938. 7	1939. 8	1940. 9
Coal carbonized, tons	5,403	5,234	5,198	5,190	5,561	5,452	5,490	6,321
Total cost, £	6,739	6,102	5,374	5,366	5,637	6,435	6,744	9,446
Coal cost per therm made, pence	5.48	5.00	3.83	3.82	3.86	4.50	4.48	5.52
Residuals realized per therm made, pence	2.49	2.17	2.02	2.48	2.38	2.58	2.54	3.34
Net coal cost per therm made, pence	2.99	2.83	1.81	1.34	1.48	1.92	1.94	2.18
Therms made per ton of coal	54.60	56.00	64.67	64.87	63.00	62.96	65.70	64.93
Coke made for sale per ton of coal, cwt.	8.48	7.77	7.70	8.27	7.2	7.81	8.08	9.11
Breeze sold	*Nil*	*Nil*	*Nil*	*Nil*	*Nil*	*Nil*	*Nil*	*Nil*
Coal cost per ton, including handling on Works	24s. 11.3d.	23s. 3.8d.	20s. 8d.	20s. 8d.	20s. 3¼d.	23. 7.2d.	24s. 6.8d.	27s. 6.7d.
Coke sales realized per ton	21s. 6d.	21s. 5.4d.	22s. 9d.	28s. 8¼d.	28s. 6.76d.	38s. 10.8d.	30s. 5.8d.	35s. 0.4d.
Cost of gas into holder, pence per therm made	5.50	5.67	4.05	3.68	3.83	4.01	3.80	4.29
Average receipts for gas per therm sold, pence	12.78	12.85	11.01	11.01	11.13	10.61	10.53	11.00
Number of different coals used	5	16	28	10	5	5	4	4
Non-coking coal used, tons	*Nil*	687	1,255	2,247	1,655	1,523	1,055	796
Non-coking coal used, per cent.	—	13.1	24.2	43.4	29.8	28.0	19.2	12.6

* Year of acquisition by Gas Consolidation Limited.

Work of the Gas Research Board*

Report of the Director

(*Continued from p. 624*)

Work at the Fuel Research Station†

At the Fuel Research Station most of the work has been carried out using water gas of varying H_2/CO ratio, although some attention has been paid to coal gas. With water gas of high H_2/CO ratio the most suitable catalyst for work at a relatively low temperature has proved to be a nickel catalyst promoted by thoria and supported on kieselguhr. This catalyst has been adopted as a standard in the investigation of variables.

The rate of poisoning of the catalyst is not serious if the sulphur content of the process gas is kept below 0.1 gr. per 100 cu.ft. This has been achieved by using an iron oxide-sodium carbonate contact material at 180° to 230°C. Water gas sometimes contains iron carbonyl; iron deposited on the catalyst from this substance reduces its life about 5%, which is not sufficient to justify the cost of its removal in a commercial unit.

Using purified water gas, conditions have been found in the laboratory which give a catalyst life of 77 days, during which time the methane content of the CO_2-free gas varied from 80 down to 30%, with an average at 65%.

The ratio of H_2/CO in the process gas is an important factor, since carbon is deposited concurrently with the synthesis of methane. In order to prevent undue deposition of carbon the ratio must be kept above 1.5. Carbon deposition can be reduced by dissipating the heat of reaction—*i.e.*, limiting the rise of temperature of the catalyst—and the most effective means has been to use a mercury bath. Size of catalyst is another factor, and the smallest size of granular catalyst which can be used without causing excessive carbon deposition is 5 to 7 mesh B.S.; also, if the pressure is increased above atmospheric the carbon deposition reactions are accelerated preferentially.

In the laboratory, by-passing of the catalyst constitutes a serious difficulty, so that the best results are obtained only when the gas is passed vertically downwards through the catalyst bed. Under these conditions and using an H_2/CO ratio of 1.5 and an exit temperature of 350°C., the process gas can be treated at the rate of 3,700 volumes per volume of catalyst per hour. The 77 days of effective life can be increased to 120 days if part of the thoria in the standard catalyst is replaced by magnesia.

Difficulties have been experienced, however, in developing these experiments to a semi-scale apparatus processing 5,000 cu.ft. of gas per 24-hr. day. Even when the difficulty of carbon deposition was overcome by a suitable design of reaction vessel the life of the catalyst was still much shorter—*i.e.*, 50 days. The difficulty is not due to carbon deposition nor to the different depth of the catalyst bed, nor apparently to any factor other than the rather different design of the reaction vessel. The problem is still being studied.

An interesting observation on catalysis arises from the fact that the potassium carbonate used in the manufacture of the catalyst may contain impurities, such as phosphates, which influence its tendency to deposit carbon, and also its life.

In the case of coal gas it is not possible to remove sulphur compounds to the desired extent by the method used for water gas, but two other methods have been developed. Each involves thorough washing of the gas with oil, followed by passage over a suitable iron hydrogenating catalyst and absorption of the hydrogen sulphide formed. It has been found that the unsaturated compounds must also be removed from coal gas, since they deposit considerable amounts of carbon on the synthesis catalyst. The only satisfactory method so far used has been to freeze out these compounds; if the temperature used is sufficiently low, sulphur compounds can also be removed in this way. The method of sulphur purification developed in the Gas Research Board laboratories would, of course, be applicable in this case also.

Removal of Organic Sulphur Compounds from Coal Gas and Other Gases

The removal of organic sulphur compounds from synthesis gas mixtures is essential when using catalysts of the type required for the synthesis of methane, since these are rapidly poisoned by traces of sulphur compounds. Also, the removal of organic sulphur compounds from coal gas has become a matter of pressing importance.

Processes applied to town gas are of three types:

(i) Drastic oil washing by which the organic sulphur content can be reduced to about 8 gr. per 100 cu.ft.

(ii) The sulphur is hydrogenated over a catalyst to hydrogen sulphide and removed by iron oxide in the usual way.

(iii) The sulphur is oxidized to sulphur dioxide over a catalyst by the introduction of a small amount of air or oxygen, and the SO_2 removed by washing with an alkaline solution.

Process (i), being limited in its performance, is of less interest to-day than catalytic processes which promise the removal of sulphur compounds down to 2 or 3 gr. per 100 cu.ft.

The catalytic process first introduced (Carpenter-Evans) used a reduced nickel catalyst to hydrogenate carbon disulphide to hydrogen sulphide at about 450°C. This dealt satisfactorily with the CS_2 but did not eliminate the more resistant organic compounds, leaving a residue of about 8 gr. per 100 cu.ft., which would have been very much less had the gas been scrubbed for benzole.

The second process (Gas Light and Coke Company—British Patent No. 489,398) employs a nickel sub-sulphide catalyst under conditions in which catalytic combustion takes place. The sulphur compounds, other than thiophen, are oxidized to sulphur dioxide. The outlet gas contains all the thiophen, with one or two grains of other sulphur compounds. After extraction of benzole from the gas the total sulphur content is reduced to 2 or 3 gr. per 100 cu.ft. A plant capable of treating 1½ million cu.ft. per day of coal gas made in horizontal retorts has been at work for several years. The ingoing gas is warmed to about 200°C. by heat exchange with the treated gas, which leaves the catalyst at about 350°C.

A third process, which has not yet been applied outside the laboratory, is the use of cobalt thio-molybdate in a hydrogenating system (British Patent No. 490,775, 1936, Maxted).

The efficacy of molybdenum sulphide as a hydrogenating catalyst is well known; in the conversion of tar to low-boiling oils the sulphur in the tar is converted entirely to hydrogen sulphide. Research work at Leeds has been directed partly towards a robust catalyst of this type, and also towards the application of a chromium-activated copper catalyst of the type first suggested by the Badische Company (British Patent No. 2306, 1914).

Using a chromium catalyst in the early stages of the work it was found that, while most of the organic sulphur could be removed from coal gas at 500°C., thiophen was not attacked. With water gas (15 gr. sulphur) the performance was better; the purified gas, after passing through two vessels in series, contained only 0.02 gr. per 100 cu.ft. Later, a copper-chromium catalyst, supported on active carbon, was developed with high activity at as low a temperature as 250°C.; purification in one stage reduced the sulphur content to 0.3 gr. and in three stages to 0.002 gr., which was sufficiently low for use in methane synthesis with a cobalt or nickel catalyst. The two stages each require one volume respectively of catalyst space per 7,000 vols. of gas treated per hr. One experiment has been continued for several months without loss of catalyst activity.

With coal gas this catalyst is rapidly poisoned, apparently by unsaturated hydrocarbons, and must be protected by a hydrogenating catalyst of the molybdenum sulphide type. A combined catalyst has been found to have a long life at 300°C. when reducing 20 gr. of organic sulphur per 100 cu.ft. to 2 gr., a finding which, though of no value in treating synthesis gas, is of interest in the purification of town gas.

Other considerations of importance to this research are:

(*a*) The first catalyst, in addition to preventing the poisoning of the second, has the useful property of promoting the combustion of any oxygen there may be in the coal gas, thus liberating heat depending in amount on the oxygen concentration, which assists in maintaining the temperature of the catalyst.

(*b*) Under conditions when such heat is being produced within the mass of the first catalyst, a considerable degree of conversion of organic sulphur to hydrogen sulphide occurs at the same time. This is true particularly for a molybdenum sulphide catalyst which, in these circumstances, may convert sufficient organic sulphur to allow the second catalyst to be dispensed with. Such a catalyst has been tried out on the laboratory scale with vertical retort gas for a period of six months without any sign of failure. The gas before stripping from benzole contained 25 to 30 gr. of organic sulphur per 100 cu.ft. and after a gas oil wash 20 to 25 gr. per 100 cu.ft. After catalytic treatment with molybdenum sulphide at 300°C. at 2,000 vols. per vol. of catalyst per hr., these quantities were reduced to 5 gr. and 2 gr. respectively for unwashed and washed gases.

(*c*) In the systems so far described the hydrogen sulphide resulting from the decomposition of the organic sulphur compounds remains in the gas leaving the catalyst and must be removed by iron oxide catch boxes. It has been found possible, however, to replace the second catalyst by a reagent which not only acts as a catalyst, but at the same time retains the hydrogen sulphide as a metal sulphide. Such a reagent would require periodic renewal and it must, therefore, be cheap. Certain iron ores have been found suitable. In certain circumstances they remove the whole of the hydrogen sulphide produced by catalytic decomposition, rendering subsequent purification unnecessary. In addition, the removal of hydrogen sulphide disturbs an equilibrium which would otherwise be set up between it and certain organic sulphur compounds and, as a result, the efficiency of organic sulphur removal is increased. On the laboratory scale the sulphur content of a mixed vertical and horizontal retort gas was reduced from 20 gr. to 1.5 gr. per 100 cu.ft.

The sulphur compound which chiefly escapes destruction is thiophen. Washing the purified gas with oil, particularly under pressure, will remove it, but is not a practical method. It has been found, however, that a molybdenum sulphide catalyst can be prepared which will

* From G.R.B. Publication No. 8.

† This account of the work carried out at the Fuel Research Station is published by permission of the Director of Fuel Research.

decompose thiophen at 300°C. almost completely. This is a pure pelletted molybdenum sulphide, but a cheaper form gives satisfactory results, as shown by long-continued tests at Meadow Lane Gas-Works on both stripped and unstripped gases, where 12,000 cu.ft. of gas have been treated by 3 cu.in. of catalyst at the rate of 2,000 vols. per vol. of catalyst per hr. A satisfactory method of re-activation has also been established.

Only minor difficulties now require examination, but further life tests on gases containing a different distribution of sulphur compounds such as horizontal retort gas are still necessary. If these prove satisfactory the next step is to examine the catalyst on a larger scale.

Reactive Coke for the Government Utility Producer*

The Director, the Secretary and one Member of Council have been directly concerned, in connexion with the Chemical Advisory Committee on Producer Fuel of the Ministry of War Transport, with experimental work carried out for the Ministry which has shown that coke made in continuous vertical retorts from selected graded coals forms a satisfactory fuel for the Government utility producer. The coal must be of low ash content (less than 4.5 per cent.), uniformly graded over ½ in. and of slight to medium caking power (type C to type G1 of the Gray-King assay). A survey of such graded coals has shown that at least 8 million tons are produced annually.

Several Gas Undertakings have co-operated in carbonizing batches of coal under test conditions, and at Birmingham (through Mr. T. F. E. Rhead, Member of Council) a small plant activating graded coke with sodium carbonate has also been operated.

In the continuous vertical retort, coal of the above type gives a low yield of gas and a low calorific value in comparison with normal gas coal, but by operating at a retort temperature lower than normal by 50°C. and increasing the throughput, the normal output of gas per retort can be maintained. The reason for the decrease of temperature is mainly to produce a coke of higher reactivity, since the C.A.B. value of the graded fuel should not be higher than 0.45.

It has been established that one type of coke breaker will give a yield of sized coke (¾ to ⅜ in.) equal to 85% of the lump coke. At this efficiency a suitable coal which gives a total coke yield of 12.0 cwt. will give 9.5 cwt. of graded fuel and 2.5 cwt. of fine coke below ⅜ in. in size.

Extensive road trials of the utility producer have shown that the graded fuel gives satisfactory performance, and that 16 lb. are equivalent in performance to 1 gallon of petrol. Trouble with clinker has been reduced to a minimum and filtration difficulties have been overcome, one filter unit working for 2,000 miles before cleaning, and engine wear being no more than with petrol.

It is still in question whether activation with sodium carbonate is necessary. Such activation makes for greater ease of starting and gives an improvement in flexibility. It would, moreover, be an insurance against those changes in carbonizing conditions or coal which might make unactivated coke less satisfactory at times.

Survey of Gas Quality

A review of the literature of the subject of the combustion characteristics of town gas was made by the Joint Research Committee of the Institution and Leeds University during 1937† and an examination was made of the standard Aeration Test Burner.‡ The conclusion was reached that further research was necessary. Since then combustion characteristics of pure gases and mixtures have been examined in a different way by Fuidge, Murch and Pleasance,§ who have developed combustion and aeration diagrams and applied them to town gas. Their researches have been continued and a further account has just been published.‖

All the factors have not been explored, however, which govern the efficient combustion of coal gas in different appliances. A fundamental research would seek to elucidate in turn the effect of factors such as the proportion of the different constituents, their effects upon one another, and physical properties such as viscosity, density and rate of propagation of combustion. As a first step it was decided to explore the variations of " gas quality " which now exist in the Industry in order to provide a factual background against which the performance of any appliance may be considered in the future. The existence of such knowledge will also clarify any discussion relative to the quality of the gas which may be produced by any new or modified process in which the Board may be interested. Further, there will be a reduction in the volume of any fundamental work to be carried out when this work can be started, because a closer definition of its limits will be possible.

At present the variations in gas composition are connected with different methods of preparation, such as carbonization in horizontal and continuous vertical retorts, the carburetting of water gas, and with the coals used. It was decided to cover as many of these variations as possible by arranging for a research chemist (J. W. Wood) to visit a selected number of Works and make observations of the "quality" of gas. This step was taken in preference to collecting information from Works, in order to eliminate the variable factor of local differences in the methods adopted.

The co-operation of a sufficient number (16) of undertakings is already assured, the necessary equipment has been collected and a start made at the first works (Leeds, horizontal and continuous vertical retorts).

All the properties which are considered even remotely to affect combustion and other characteristics will be observed and in addition the opportunity will be taken to determine the proportions of the different organic sulphur compounds present (see below). The properties which will be observed are chemical composition, air-requirement for combustion, calorific value, specific gravity, and behaviour in certain test burners. One of these will be the Aeration Test Burner, but the use of this will not be confined to mere observation of the A.T.B. Number —*i.e.*, the air-shutter opening necessary to produce an inner cone of specified dimensions. Rather will it be regarded as a standard Bunsen burner of which the air shutter can be adjusted to definite values and the corresponding cone height and flame height observed over the widest range of working conditions of which the burner is capable. Observations will also be made of the behaviour of luminous burners of the rat-tail and flat-flame types. The systematic examinations of gas appliances has been excluded from this preliminary survey, the object of which is to focus attention on the gas.

The Undertakings approached have been selected to cover as wide a range as possible in the kind of coal carbonized, type of plant and declared calorific value. The results of the survey should therefore give some idea of the extent to which the above factors are responsible for the observed variations in gas quality. It should also be possible to determine the effect of mixing gases from different units of plant, the effect of age and condition of plant, and the effect of adding blue or carburetted water gas to the coal gas stream. Such information should be of value in formulating proposals for the better control of gas quality. It should also provide a useful basis for further laboratory investigations into the effect of changes in gas quality upon the performance of appliances.

Sulphur Survey

While the survey of gas quality is in progress it is intended also to make a survey of the sulphur compounds in the various gas supplies. This will not be confined to the determination of the total sulphur content of each gas, but will embrace the determination of the proportions in which the principal types of sulphur compounds exist, notably mercaptans, thiophen, carbon disulphide and more volatile sulphur compounds.

Since a considerable reduction in the sulphur content of town gas will be an important feature in the post-war policy of the Gas Industry, and as the choice of the processes to be adopted for sulphur removal may very well depend upon the proportions in which the principal sulphur compounds are present, the advisability of collecting such data should be evident.

Production of Liquid Methane*

For several years past at the Imperial College a group of workers under the direction of Prof. Sir Alfred Egerton has been investigating the liquefaction of methane and its use as a fuel for internal combustion engines. The work was sponsored originally by the Department of Scientific and Industrial Research, and later by the Ministry of War Transport.

To secure a supply of liquid methane, a cascade liquefier was built at the Imperial College and erected near Stoke-on-Trent to give up to 2 gall. per hr. of liquid methane from a gas containing 97 to 98% CH_4 obtained from a colliery blow-hole. Storage tanks and vehicle equipment were developed, and a great deal of data was collected on the performance of the liquefier and the handling of the liquid. More recently a larger supply of liquid methane has been required than the Stoke plant can supply, and this has been obtained by liquefying a gas mixture containing a high proportion of methane, and rectifying the liquid. The product is to be used to carry out a protracted running trial on a bus fitted with the most recent design of vehicle equipment.

Gas refrigeration and liquefaction are of particular interest to the Gas Industry, because they provide a ready means of separating the constituents of coal gas. The progressive cooling of coal gas in a liquefying plant can produce three important results:

(i) The removal of constituents normally removed in the Industry by other means,—*e.g.* benzole. At the same time water vapour and organic sulphur compounds would be removed entirely.

(ii) The removal of valuable constituents at present burned in appliances—*e.g.* ethylene and propylene.

(iii) The removal of part of the methane for storage as a liquid during the summer months, for use in enriching water gas at periods of high demand. This smoothing of the load on gas-making plant throughout the year should be of the first importance economically. The evaporation of methane from store could be linked with the separation of oxygen from air, to be used for the continuous production of water gas or in processes of complete gasification. Another use for liquid methane might be in its transport from large gas-making concerns to small local works, where it could be evaporated and supplied to the community, thereby avoiding the necessity for carbonizing plant which is inefficient because of its small size.

(*To be continued*)

* The above account is given by permission of the Director of Vehicle Maintenance and Alternative Motor Fuels of the Ministry of War Transport.

† *Trans. Inst. Gas Eng.*, 1937-38, **87**, 84.

‡ *Ibid.*, 1937-38, **87**, 140.

§ *Ibid.*, 1939-40, **89**, 289.

‖ *Inst. Gas Eng. Comm.* No. 266 (1943).

* This account is published by permission of Prof. Sir Alfred Egerton.

Water Gas and Relief Holders

A highly interesting new patent (No. 560,584, dated April 11, 1944) is that granted to Humphreys & Glasgow, Ltd., and H. T. Cohen. It refers to plant for the manufacture of coal gas and water gas in which the coal gas is drawn from the retort house and the water gas from the generating plant by an exhauster for delivery, usually through purifiers, to storage. As the patentees point out, to provide a reservoir of water gas at a steady pressure for the exhauster to draw from, it is usual to have a relief holder of such a capacity that the cost forms a considerable proportion of the total cost of the installation. The object of the patent is to provide a less expensive arrangement which will effectively prevent sudden pressure variations at the exhauster inlet and give the exhauster governor time to take full control.

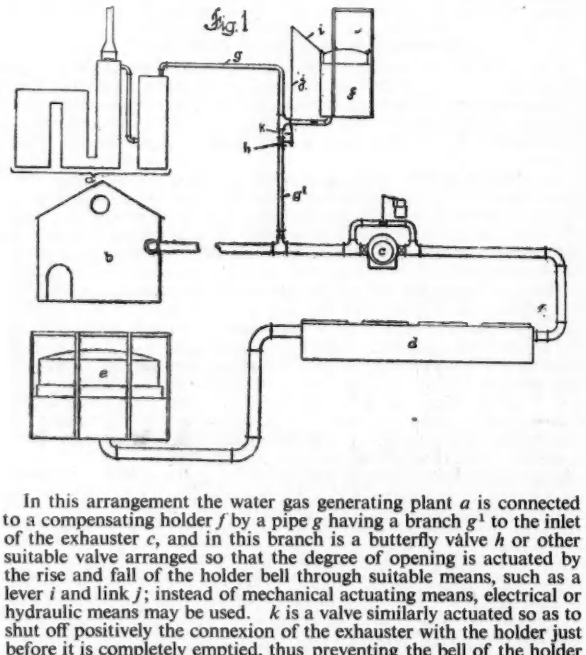
The water gas generator is connected to a small holder, and means are provided whereby a connexion between this holder and the inlet of the exhauster is gradually opened by the rising of the bell of the holder and gradually closed by its fall. The holder is of considerably less than the usual capacity—for example, of only sufficient capacity to provide a supply of water gas during a blow period or a blow period plus the time required to place a charge of fuel in the generator, or rather more.

At the beginning of the water gas making period the holder, where its capacity only slightly exceeds the volume required to supply gas during the blow period, will be nearly empty and the connexion closed; as water gas is made and passes to the holder, the bell will rise and the connexion to the exhauster will be gradually opened. Thus sudden fluctuations in the flow of water gas to the exhauster are prevented, and changes take place sufficiently slowly for the exhauster governor to follow them and maintain a substantially constant pressure at the exhauster inlet.

The arrangement can be usefully applied in cases where a separate exhauster is used for the water gas but in which no relief holder is provided. Also, by evening-out the flow of water gas, the device may enable the water gas to be added to an existing gas stream at the inlet of an existing exhauster in cases in which, due to the otherwise fluctuating flow of the added water gas, the capacity of the exhauster and/or connexions thereto would have been inadequate, but in which, by the application of the device, the resulting steady addition of water gas at the exhauster inlet can be accommodated by the exhauster and connexions.

Referring to the accompanying drawings, fig. 1 is a diagrammatic illustration of plant embodying the invention. *a* represents the water, gas apparatus, *b* the coal gas retort house, *c* an exhauster delivering gas through purifiers *d* to the storage gas holder *e* and provided with the usual valved by-pass from the outlet to the inlet.

Fig. 1



In this arrangement the water gas generating plant *a* is connected to a compensating holder *f* by a pipe *g* having a branch g^1 to the inlet of the exhauster *c*, and in this branch is a butterfly valve *h* or other suitable valve arranged so that the degree of opening is actuated by the rise and fall of the holder bell through suitable means, such as a lever *i* and link *j*; instead of mechanical actuating means, electrical or hydraulic means may be used. *k* is a valve similarly actuated so as to shut off positively the connexion of the exhauster with the holder just before it is completely emptied, thus preventing the bell of the holder being subjected to suction.

In another arrangement illustrated in fig. 2, separate upwardly extending pipes *g* and g^1 lead the water gas into and out of the holder *f*, and a tapering valve *h* adjustably supported from the holder crown extends into the outlet pipe g^1 and varies the area of passage into it in accordance with the position of the holder bell. Preferably the tapering valve is surrounded by a curtain or dip pipe *l* attached to the holder crown and serving to seal off the outlet pipe completely when the holder is nearly empty. Usually the tapering valve and the curtain or dip pipe are attached as shown to the cover *x* of a manhole in the holder crown; the valve *h* is shown suspended by a chain *y* from an adjusting screw *z* working through the cover *x*.

Instead of a tapering valve a butterfly valve actuated by the holder bell may be used to regulate the flow through the outlet pipe g^1; or instead of the curtain or dip pipe a shut-off valve actuated by the holder bell may be used.

In some cases the tapering valve may be dispensed with and the curtain or dip pipe be slotted for some distance from its lower end, and thus serve to vary the flow and to seal off completely the outlet pipe from the holder.

Fig. 2

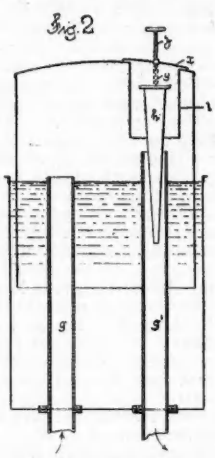


Fig. 3

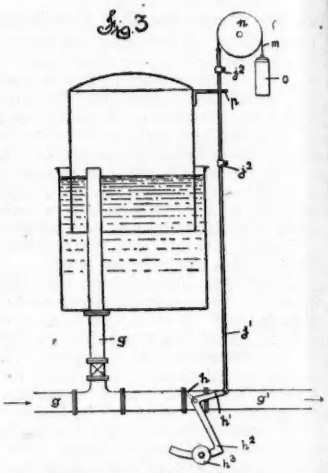


Fig. 3 illustrates a modified valvular arrangement which normally permits a rate of flow of water gas to the exhauster approximating to the average rate of production of water gas throughout the operating cycle (including the blow period), but which is actuated, when the compensating holder bell rises beyond a certain limit, so as to permit a greater flow of gas and, when the compensating holder bell falls below a certain limit (as when gas-making is stopped to charge the water gas generator with coke), so as to decrease the flow of gas and, it may be, ultimately stop it, the actuation of the valvular means being such as to change the rate of flow gradually so that the exhauster governor can follow and keep pace with the changes in flow. In this arrangement in the pipe g^1 is a butterfly valve *h*, an arm h^1 on the spindle of which is connected to a rod j^1 provided with spaced adjustable stops or abutments j^2 and suspended by a cord *m* passing over a pulley *n* and attached to a balance weight *o*, a prong or lug *p* projecting from the bell of the compensating holder contacting with the stops or abutments towards the extreme positions of the bell and gradually altering the position of the valve. To enable the position taken up by the valve when not affected by the position of the holder bell to be set to suit the average rate of water gas production, another cranked lever arm h^2 on the valve spindle is provided with an adjustable weight h^3 secured thereon by a set screw. The distance of weight h^3 from the spindle fulcrum will determine the position at which the lever arm and valve will come to rest.

Other means of adjustment of the position taken up by the valve when uninfluenced by the holder bell may be adopted.

A Net Profit of £14,378 for the year ended Dec. 31, 1943, was reported at the annual meeting of the Montevideo Gas and Dry Dock Company in London on May 16. Sales of gas were reported to have shown an increase of 5.5% over 1942, and consumers had increased by 1.5%. A final dividend of 3%, free of tax, was declared, making 4% for the year, the same as for the previous year.

Personnel Administration has published a Memorandum on "The Personnel Function in British Industry." The aim has been to stress that personnel work should not be confined to a particular department, but is part of the duty of each individual in a company. This personnel function is traced through all sections of an organization—from the board of directors to the workshops. In connexion with this work the firm has developed specialized methods of training operatives and supervisory staffs. Those interested should apply to the firm at 130, Mount Street, London, W. 1.

New Details of the Blackman streamline fan are given in a 48-page booklet issued this month by Keith Blackman, Ltd., under the title of "Blackman Volume Fans V1". The streamline fan, widely used for ventilation, drying, and removal of fumes and steam, may be driven by belt or by electricity (A.C. and D.C.) and is made in a series of standard sizes, of which the various capacities, speeds, &c., are set out in the booklet. To ensure successful results, the makers advocate close co-operation between the user and the fan maker, and where it is difficult to indicate by letter or drawings the object to be achieved, they offer to send technical representatives to discuss details with prospective clients, and to take the necessary particulars for the preparation of schemes and estimates.

Benzole Recovery by Activated Carbon

(*Continued from p. 635*)

Mr. **F. G. Shaw** (Buxton) said that a similar type of plant had been successfully operated at Buxton. On an installation of Glover-West 50 in. continuous vertical retorts, the benzole plant during the twelve months ended December, 1943, yielded 3.69 gallons of benzole per ton carbonized, sold and paid for at the rate of 1s. 4½d. per gallon when delivered into road tanks at the gas-works. This was an important point, and not very much appeared to be needed in the way of comment. He thought that even Dr. Barash would be satisfied with that result.

The figures now being reached in Manchester were probably not as good as those which would be reached in the future, owing to the very difficult circumstances in which Manchester had had to work. Much depended upon the quality of the coal carbonized, though whether quality was the right word to use he could not be certain. There had been no marked falling off in the efficiency of the carbon at the shorter cycles to which reference had been made, even at the full load for which the plant was designed. Even on the shorter cycles, it had been possible to maintain an extraction efficiency to a much higher degree than appeared to be indicated in the Paper. He was pleased to be able to state that the sulphur recovery figures had been maintained much better than was indicated in the Paper. He felt very interested in this point, because he did not consider it possible to dissociate benzole recovery from the question of the removal of sulphur compounds. All the catalytic processes of which he had heard did not remove thiophene. Again, the thiophene was recovered with the benzene in the plant. If the gas was put through a catalytic process a certain amount of sulphur would still have to be removed which the plant would eliminate. Therefore there would be sulphur in the benzole. He did not know whether there were new methods on the market which dealt with such figures; he had not heard of any. It would be found profitable not to over-run the carbon, and he quite agreed with the Southport representative on that point.

At Buxton the gas made was recorded on the inlet and outlet of the benzole plant by means of Sigma recorders. Test lights were found to be extremely useful.

He was interested in the selenium cell idea and the indication of the luminosity of the flame. Another point arose in connexion with the handling of an extremely light spirit. There was a marked difference between handling benzole at 0.803 because of the light ends. Pipes—especially suction pipes—had to be laid very carefully, with full-way foot valves, so that there should not be gas-locks. Care must also be exercised to ensure that the delivering of the benzole into road tanks was done through directly connected pipe properly jointed. Storage tanks must be most accurately calibrated; this was important, and time spent upon it was of the utmost value. It would then be possible to maintain the percentage of loss at a very low rate indeed.

Mr. Walker had mentioned that steam consumption was 40 lb. per gallon. It was to be assumed that the steam cost was taken at about 5s. per ton of steam.

At Buxton they continued their practice for many years past of making gas at 480, and reducing it through the benzole plant to a declared value of 450. They re-declared their value from 480 to 450 when they installed the benzole plant. He appreciated the remarks about sulphuretted hydrogen, but there had been no generation in the Buxton benzole plant. There had been a mishap with the purifier centre valve recently, and a somewhat large concentration of H_2S in the gas was passing for several hours. He was pleased to be able to state that the activated carbon plant removed this completely until repairs were made to the purifier valve.

In his experience the plant combined high efficiency with reliability. It required little attention, but that attention should be skilled technical supervision. The working of the plant was a revelation to those who, like himself, had had previous experience of the oil-washing type of plant, while the laboratory was kept much cleaner and not like the sort of scullery which he was wont to associate with oil washing. There was a wide field opening up in the Gas Industry and in the coke oven industry for this type of plant. It gave gas engineers and coke oven managers at least one plant to work with that was clean, which would be a pleasant change.

Mr. **H. H. Knowles** (Buxton) said the experience at Buxton and the results obtained on eight charges of carbon indicated that it was possible, in regular operation, to obtain approximately 99% benzole recovery and over 60% sulphur compounds removal, continuously on all cycles, up to the time the carbon was changed. This was the general practice on the plant: Plant rated at 800,000 cu.ft. per day.

Carbon number.	Average yield per ton.	Maximum and minimum yields on all cycles. Gallons/ton.	Variations in yield. Gallons/ton.
1	3.750	3.840–3.510	0.330
2	3.740	3.780–3.650	0.130
3	3.735	3.853–3.634	0.219
4	3.739	3.841–3.618	0.223
5	3.730	3.866–3.627	0.239
6	3.776	3.921–3.520	0.401
7	3.774	3.851–3.565	0.286
	Average 3.749 gallons/ton.		Average 0.261 gallons/ton.

Average benzole make to date	... ...	3.749 gallons/ton.
,, variation between maximum and minimum yields on all cycles	...	0.261 gallon/ton.
,, benzole sold ...	... ...	3.691 gallons/ton.
,, pumping and vent losses plus tank calibration and dipping errors	...	0.058 gallon/ton.
,, gallons benzole per 1 lb. carbon	...	7.246.
,, tests on benzole sold:		
Specific gravity	... ...	$\frac{15.5°C.}{15.5°C.}$, 0.808.
% at 100°C.	... ...	69.
% at 160°C.	... ...	94.
Sulphur in benzole	... ...	1.2 to 1.5% W/V depending on coa carbonized.
,, in gas	... ...	Varies between 13 to 8 grains/100 cu.ft. Average 11.1.
,, removal	... ...	Usually approximately 66%.

Mr. **A. L. Holton** (Manchester) said that anyone who had had anything to do with the operation of new plants would know full well they had all got their teething troubles, and he was very glad to find that the Authors of the Paper had set these forth in their communication. Those engineers who purposed installing such a plant would know where to expect difficulties. One of the main features to be considered would be the reduction of the sulphur content to a figure which would permit the burning of the gas fluelessly. Manchester's figure had not yet reached that point, and it had been said that it was a mistaken point of view to look upon the plant as a sulphur recovery and benzole recovery plant combined.

Personally, he would have liked to have seen a balance-sheet, though he appreciated the difficulty of producing one owing to the recent installation of the plant. Nevertheless, if there was a drop in price of the benzole in the order of 0.6d. there would be 25% put on the costs. Assuming there could be a process for the purification of the benzole, he thought that this would be an extra cost.

In the course of the discussion it had been mentioned that when the plant was installed the C.V. was lowered from 480 to 450. He thought he was correct in stating that quite a number of undertakings in the country raised their C.V. in order to enhance their revenue. Therefore, if they went the other way and because of the benzole plant the C.V. was reduced, there must be a reverse effect which should be put up against the cost. The type of benzole plant was largely a matter of what type of carbonizing plant was in use. Those people who were working horizontal retorts knew they could get a very high C.V. gas with a high thermal yield. If there was a reduction of throughput on verticals then it should be definitely a charge against the process.

He noticed that in the Paper, for the first cycle on the first batch of carbon, the figures given were 120 minutes for the cycle for a period from the middle of March to the end of June, but that in the second batch the period only went to one month. What was the reason for the drop? There were three other people at least who had a similar kind of plant, and their figures varied very much from the figures shown in the Manchester case. It would appear, therefore, that there was much yet to be ascertained in regard to the working of the plant and its efficiency. Such information, of course, would be valuable and available in course of time.

Mr. **H. C. Applebee** said that the dates of cycles and their duration were somewhat confused. The fact was that the dates shown on the second table were selected periods during which the plant was working at the particular cycle indicated, and it was not possible to draw any direct comparison between those dates and the figures given in the previous table. In the interval between April and June, for instance, there was quite a long period in which there was operation on an 80-minute cycle in addition to the period stated lower down. This was due to circumstances which would involve too much detail to explain at the moment.

Mr. Holton had mentioned a drop in the value of the crude benzole. It had already been stated that there were processes capable of dealing with the high sulphur content, and Mr. Holton mentioned that they would cost money. This was quite correct, but, on the other hand, when the benzole was treated by means of those processes the value of the benzole increased, and the increase in the value of the benzole was considerably more than the cost of the process.

Mr. **P. Gallagher** (Atherton) said that a Sutcliffe Speakman activated carbon plant had been in operation at Atherton for 13 months, where the carbonizing plant consisted of horizontal retorts with producer gas dilution. It was a small plant and had worked continuously since its installation, except for the changing of the carbon. Up to date it had recovered 25,000 gallons and the average had been 3 gallons per ton, the recovery varying between 3.2 and 2.8 gallons per ton, and being fairly constant. An interesting point about the quality was that they had never yet sold benzole under 95% at 160°. For that, of course, they received an extra 0.3d. per gallon on the evaluation test. They had not experienced the trouble that Manchester appeared to have had, and were in the rather fortunate position of both Southport and Buxton. The sulphur content of the benzole had varied very considerably. That was not due to the plant but to the varying qualities of the coal carbonized, and at the present time it seemed to have steadied down to between 1.2 and 1.4%. The specific gravity was, of course, much higher than that of benzole from verticals. In their case it was 0.872. The Ministry of Fuel and Power had carried out a freezing test on the gas at the inlet and outlet of the plant, and had found that over 98% of the benzole in the gas was being recovered. This was most satis-

factory, having in mind that at the time the test was taken it was considered that the carbon was due for reconditioning.

Mr. **A. Ormrod** (Liverpool) said that so far much of the discussion had centred upon the deterioration of the quality of the carbon during its working life, but nothing had been said about the measurement of the initial activity of the carbon. It did seem to be the case that there was a considerable variation in the initial activity of the carbon. Were undertakings who were going to operate this type of plant to be entirely in the hands of the manufacturer in this matter, or was some attempt being made to obtain a measurement of the initial activity?

A second point he would like to bring forward was the effect of benzole recovery on the volume of gas made. Various speakers had hinted at this point, and Mr. Walker in his reply to one question seemed to indicate that it should be possible by increasing output from the vertical retorts to maintain the same gas volume, when recovering benzole in the order of 3.5 gallons per ton, as was obtained prior to benzole recovery. Personally he doubted that, if the carbonizing plant was working at its full capacity under conditions of no benzole recovery, the coal throughput could be increased to such an extent as to guarantee that the same gas volume would be available when extracting such an amount of benzole. He was aware that other people held different views on the subject. This was, of course, a very important factor when considering the evidence of benzole recovery on a carbonizing plant just capable of accepting a particular load under conditions of no benzole recovery.

A third point was the corrosion of the condenser. It was not made quite clear in the Paper whether the sludge was found entirely on the water side of the condenser tubes or on both sides. It occurred to him that this corrosion, which was, in the opinion of the Authors, if not initiated by, certainly helped by, the presence of cyanides in the condensate, might continue to give trouble on the vapour side of the condenser even when the water condensate was rejected from the cooling water.

A final point was with regard to the suggestion that: "Some means of determining when benzole had ceased to flow from the condensers, so that steam might be adjusted accordingly, would help in steam economy." This seemed to raise a point which was inherent to this type of plant, and about which he was not entirely satisfied. The cycle, made up as it was of three different items, was balanced quite empirically one item against two others. How far, in fact, was the cycle justified? How far, in fact, was it true that the adsorption took twice the time for steaming, and twice the time for drying and cooling without loss of control? As indicated in suggestion No. 9, he thought there was a distinct possibility of either passing steam without gaining particular usefulness or, alternatively, of losing time for adsorption in the cycle. One or the other must almost certainly happen. He could not imagine from a review of the Paper that these functions could be so conveniently divided, and yet allow the plant to operate at the highest efficiency.

Mr. **R. Walker** said that the first point raised by Mr. Ormrod was an interesting one as well as being important. The Authors of the Paper had not made any tests, nor had they devised any, on the initial activity of the carbon, but he would suggest that there might be differences in its activity. With regard to the output from the carbonizing plant, which, of course, was the reason for getting the higher C.V., he was referring in his remarks to the desirability of ascertaining the economics on that basis, if possible. With the particular plant under discussion, like many other carbonizing plants which had been mentioned, they had gone all out for the production of benzole, and they were not suggesting that the throughput could be increased still further, because the limit of heating capacity had been reached with vertical retorts. Therefore the reduction in volume could not be made up by increasing the throughput. What he was suggesting was that the balance-sheet should be calculated on the basis of setting the plant to a certain volume, before working out details of costs upon the thermal value of the coke produced and the cost of steam. There would then be a correct comparison with and without benzole.

Mr. **A. K. Howell** remarked that to increase the calorific value of the gas they had to reduce the steaming by 6%, and by the increase in the available heat they were to some extent able to increase the coal throughput.

Mr. **H. C. Applebee** said the other points mentioned by Mr. Ormrod applied to most plants. After all, not very much was really known about the actual process, but so far as the deterioration of carbon was concerned and its variations in quality, many factors must be taken into account. In this connexion it was necessary not to lose sight of the most likely consideration—namely, that the composition and content of the gases themselves were varying. He thought that every batch of carbon which Messrs. Sutcliffe Speakman would turn out would be precisely similar to any other batch. The figures did not indicate any cause for uneasiness. In the case of Manchester much the same figures were obtained, and if they had had the same carbon it was probable that they would have achieved similar results.

The corrosion which had been experienced was from the water side rather than from the vapour side. While the first impression was that there was no corrosion from the vapour, when the tubes were taken completly out from the condenser there was found to be some evidence of corrosion occurring even on the vapour side, though to what extent he was not yet able to say.

With regard to the balance between adsorption and steaming in the various cycles, the plant was constructed that way and worked that way as far as its operators were concerned. Whether they were losing steam or not, he was not for the moment prepared to say; owing to a mishap they were not able to measure definitely what amount of steam they were using, but when the position was rectified they certainly had the intention of following up the point.

In the steaming of the adsorbers waste steam was used, so that as far as the particular plant was concerned, it was not a vital point. It was steam which was used for driving the exhaust fan, pumps, &c., and for steaming out the adsorbers. It did not matter materially whether a little steam was lost or otherwise for the present, though it would be interesting to discover if any was really lost or if economy could be effected in that respect. The steam consumption was determined, in the first instance, by the steam used on the rest of the plant and not by the adsorbers.

(To be continued)

I.G.E. Medal Awards

The Council of The Institution of Gas Engineers has made the following Medal Awards:

Institution Bronze Medal, 1943: Awarded to Mr. J. A. Tomes (Stourbridge) for a Paper, "Some Effects of War on the Economics of Gas Manufacture and Supply," read at a meeting of the Midland Junior Gas Association on Aug. 26, 1943.

Charles Hunt Memorial Medals, 1943: Awarded to Mr. W. H. B. Porter (Belfast, formerly Stockton-on-Tees) in Gas Engineering (Manufacture); and to Mr. George Gilden (Liverpool, formerly Teddington) in Gas Engineering (Supply).

No award has been made for 1943 of the Institution Gold Medal, the H. E. Jones London Medal, and the Institution Silver Medal.

The Australian Gas Light Company reports a net profit of £235,443 for the year ended Dec. 31, 1943. A dividend of 2½% on the "A" and "B" shares for the half-year to Dec. 31 has been declared, leaving a carry-forward of £16,743.

The South Midland Gas Corporation has declared a final dividend of 2¾%, making 5½% for the year ended March 31, 1944. The net profit for the year was £5,740, and the carry forward is £1,722, against £1,263 brought in.

At the Annual Meeting of the Peterborough Gas Company the following dividends were declared: £5% per annum on the new preference A shares and £7½% per annum on the consolidated ordinary stock, both less income tax.

Wellington (New Zealand) Gas Company has declared a dividend of 6% for the year to December 31, 1943, the same as for the previous year, and carried forward £15,009. Dr. C. P. Knight, Chairman, told the annual meeting that the man-power position deteriorated during the year and the staff was about 20% below normal. The coal position, in spite of the efforts of the Coal Controller to maintain supplies, was serious, and stocks were dangerously low. Extension of the carbonizing plant, consisting of 16 Glover West vertical retorts with a daily capacity of 650,000 cu.ft., had been in progress for over three years. There had been delays due to war conditions, but the erection was now nearing completion and the plant should be available for gas-making during the coming winter.

New Records in Every Direction except in the year's extensions to mains are announced in the annual report of the Perth (Australia) Gas Department. Mr. F. C. Edmonson, General Manager, states that gas sold during the year reached 621,365,136 cu.ft. against 518,600,666 for 1942, and the maximum output of gas in 24 hours for the year was 2,442,000 cu.ft. on July 24, 1943. Meters in use increased by 1,714 to 33,534. The average make was 19,060 cu.ft. per ton of coal, and the calorific value was 482.05 B.Th.U. against a declared value of 478 B.Th.U. Gross profit for the year at £85,784 was slightly down on 1942, owing to reductions in the price charged for gas.

Mr. R. J. Milbourne announced at the 46th annual meeting of C. & W. Walker, Ltd., at Birmingham on May 4, that mainly owing to war conditions the net profit for the past year was £8,261, against £19,302 for the previous year. As soon as restrictions were lifted the Company would have to lay out a large sum of money on restoration work. The normal business of the Company depended on the prosperity of the Gas Industry, and this could be extended only in so far as it was organized to give the best possible service to the community. The present year might well be the most difficult and trying of all they had experienced, owing to the intensification of operations in the European theatre of war. The tendency throughout the country was for production costs to rise, while supplies of steel, coal, gas, electricity, and labour might be restricted, so that the question of profit was more or less dependent on changing requirements dictated by the progress of the war and the precise consequences which would flow from the impact of coming military operations. Dividends were declared at the rate of 7½% on the Preference Shares and 10% on the Ordinary Shares, and £17,235 was carried forward.

On May 13 a fire occurred in the garage in which various vehicles of the firm of George Wilson Gas Meters, Ltd., were stored, and in consequence, they have all been totally destroyed. In the circumstances, while some little inconvenience may be anticipated, it will be reduced to a minimum, and the firm trusts that customers will extend their kindness and forbearance.

WO-AND-A-HALF HOURS

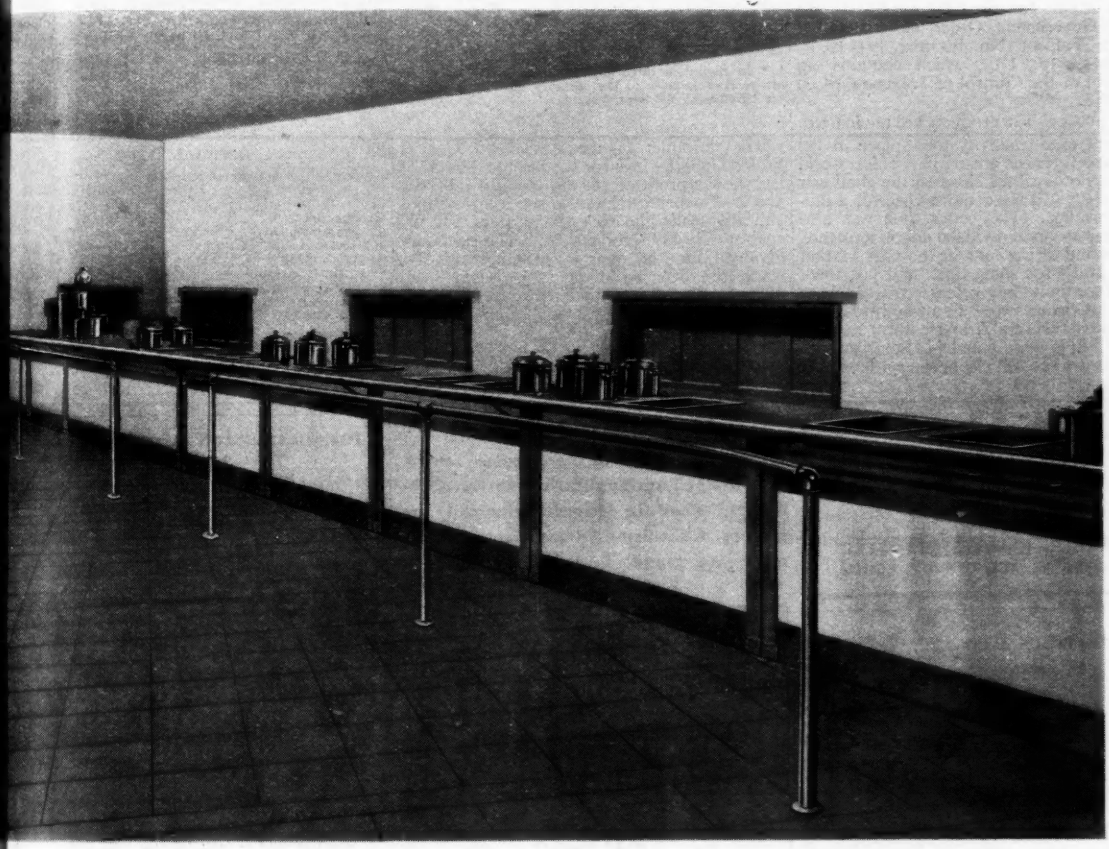


Illustration shows the diners' side of the serving counter, which consists of Hotclosets with Bain Marie on top. Hatches leading directly into the Canteen Kitchen are seen in the background.

LARGE COOKING EQUIPMENT SECTIONS
RADIATION HOUSE, ASTON, BIRMINGHAM, 6 | PALATINE WORKS WARRINGTON
SHOWROOMS AND LONDON OFFICE: 7, STRATFORD PLACE, W.1